

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Ambrysus funebris*

COMMON NAME: Nevares Spring naucorid bug

LEAD REGION: 1

INFORMATION CURRENT AS OF: November 4, 2005

STATUS/ACTION

☐ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☒ Non-petitioned

☐ Petitioned - Date petition received:

☐ 90-day positive - FR date:

☐ 12-month warranted but precluded - FR date:

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)?

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions?

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

☐ Listing priority change: no change is proposed at this time.

Former LP:

New LP:

Date when the species first became a Candidate (as currently defined): May 4, 2004.

☐ Candidate removal: Former LPN:

☐ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

☐ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

☐ F – Range is no longer a U.S. territory.

☐ I – Insufficient information exists on biological vulnerability and threats to support listing.

☐ M – Taxon mistakenly included in past notice of review.

☐ N – Taxon does not meet the Act's definition of "species."

☐ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Class Insecta, family Naucoridae (true water bug).

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: California, USA.

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE:
California, Inyo County, USA.

LAND OWNERSHIP: 100% of the distribution of the Nevares Spring naucorid bug is confined to federal lands that are administered by the National Park Service, Death Valley National Park.

LEAD REGION CONTACT: Diane Elam (CNO), 916-414-6464; Scott McCarthy (RO), 503-231-6131.

LEAD FIELD OFFICE CONTACT: Douglas Threlhoff, Ventura Fish and Wildlife Office, California (805) 644-1766.

BIOLOGICAL INFORMATION

Species Description: The Nevares Spring naucorid bug, *Ambrysus funebris*, is a flightless aquatic insect that is approximately one quarter of an inch long.

Taxonomy: The Nevares Spring naucorid bug was described using specimens that were collected from Nevares Spring in Inyo County, California (La Rivers 1948). *Ambrysus funebris* is recognized as being a valid and current taxonomic entity according to the Integrated Taxonomic Information System. The Nevares Spring naucorid bug is one of three naucorid species that are endemic to the Amargosa River drainage along the Nevada-California border.

Habitat/Life History: Naucorids typically prefer stream riffles that are swift enough to keep sand and silt from accumulating, but not so fast that coarse, gravelly substrates are removed (La Rivers 1948). Laboratory and *in situ* field studies of different naucorid species have confirmed that naucorid habitat preferences are not random, and that water velocity and substrate size play a significant role in determining animal presence or absence (Sites and Willig 1991, Herrmann et al. 1993). These studies also suggest that naucorids have ecological or physiological constraints that limit their ability to persist in modified stream habitats. Water diversion activities that modify water velocities or substrate characteristics are therefore likely to affect the distribution and abundance of naucorids because they have a finite ability to use altered streams.

Historical and Current Range/Distribution: *Ambrysus funebris* has a worldwide distribution that historically has been limited to the Travertine-Nevares Springs Complex (Complex) within the boundary of Death Valley National Park (Park). The Travertine Springs area is two miles long and one mile wide; it includes approximately 20 streams and is located 1.5-2.5 miles east of the Furnace Creek Inn and Ranch resort (Ranch) and the Park headquarters building. Texas Spring is an especially notable spring at the northwestern edge of the Travertine Springs area because it possesses a high-volume discharge. The Nevares Spring area is 0.7 miles long and 0.3 miles wide; it is located five miles north of the Travertine Springs area in an area locally referred to as Cow Creek and possesses 14 streams. *Ambrysus funebris* has a current distribution that

continues to be limited to the Complex, but the area the species now occupies is substantially smaller than what existed historically because several of the aquatic habitats where the animal occurred have been eliminated or substantially reduced in size. Seven additional aquatic invertebrate species, including one snail, at least two amphipods, three ostracodes, and one riffle beetle also have distributions that are endemic to the Travertine-Nevares Springs Complex (Threloff 2001).

Population Estimates/Status: The Nevares Spring naucorid bug occurs in the Travertine-Nevares Springs Complex where several water collection systems have been installed to provide water for commercial and domestic uses. These water collection systems have resulted in the complete elimination of, or alteration to, several wetland habitats in the Furnace Creek and Cow Creek areas. Data that describes the abundance and distribution of the Nevares Spring naucorid bug prior to the development of the water collection systems was not collected. It is likely that the species historically occupied a substantial portion of the aquatic habitat that was present in the Complex where suitable micro-habitat features were present. The widespread loss of aquatic habitat within the Complex since the water collection systems were installed suggests the species has experienced major reductions in abundance and distribution as stream environments were eliminated or reduced in extent.

Intensive surveys that determined the distribution and abundance of the Nevares Spring naucorid bug in the Complex were recently completed (Sada and Herbst 2000, Threloff 2001). These surveys documented the presence of the species in 8 of the 20 stream habitats in the Travertine Springs area (Table 1). The species' presence at Texas Spring represents an introduced population. These same surveys only documented the presence of the naucorid in 4 of the 14 spring habitats in the Nevares Spring area. One of the surveys demonstrated that the Nevares Spring naucorid bug occurs at low densities (Sada and Herbst 2000). In May of 1999, the total number of aquatic invertebrates at 72 locations in the Travertine Springs area was sampled by using 4 by 4.7 inch quadrats. This work revealed the presence of 42,777 individuals belonging to 59 species; only 36 of these individuals were *Ambrysus funebris*. Work during this same period in the Nevares Spring area documented the presence of 7,821 individuals belonging to 55 species in 31 quadrats; only 10 of these individuals were *Ambrysus funebris*. These data suggest that the species is extremely rare, even when it is present.

stream number	stream length (feet)	affected by past or ongoing water diversion activities?
Travertine Spring stream #1	137	yes
Travertine Spring stream #2	429	no
Travertine Spring stream #3	643	yes
Travertine Spring stream #4	912	yes
Travertine Spring stream #5	967	yes
Travertine Spring stream #6	2,063	yes

Travertine Spring stream #7	2,270	yes
Travertine Spring stream #8	2,500	yes
Nevares Spring stream #1	187	yes
Nevares Spring stream #2	416	yes
Nevares Spring stream #3	417	no
Nevares Spring stream #4	790	no

Table 1. Length of stream habitats occupied by *Ambrysus funebris* in the Travertine-Nevares Springs Complex, Death Valley National Park, California.

DISTINCT POPULATION SEGMENT (DPS): The concept of a distinct population segment is not applicable to the Nevares Spring naucorid bug because the species is an invertebrate.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range:

The primary threat pertaining to the Nevares Spring naucorid bug consists of water diversion activities that have adversely affected the amount and quality of aquatic habitat that is available to the species. Water collection facilities have been installed at eight locations within the Travertine-Nevares Springs Complex. Seven of these facilities provide water that is used to meet human use needs in the Furnace Creek area, and one facility provides potable and irrigation water to the Cow Creek area.

The water users in the Furnace Creek area include the National Park Service, the Timbisha Shoshone Indian tribe, and the Furnace Creek Inn and Ranch resort. Between 1987 and 2000, the Ranch consumed 92% of the water that was collected from the springs in the Furnace Creek area, and the National Park Service and Timbisha Shoshone Indian tribe consumed the remainder of the water that was collected. The average combined monthly potable and non-potable water consumption for the three water users during this period was 52,440,000 gallons per month (Psomas 2001). In 2000, the Timbisha Shoshone Indian tribe was granted reservation status and received a water right of approximately 29 million gallons of water per year. If the other two water users in the Furnace Creek area continue to collect water at previous levels, this new water right will create an additional burden to collect a volume of water that has not, for the most part, previously been diverted from the local springs.

Water collection activities in the Furnace Creek area are governed by a 1968 Memorandum of Understanding (MOU) that was signed by the United States of America, Borax (Holdings) Limited, and Fred Harvey, Inc. (i.e., the Furnace Creek Inn and Ranch). Under this MOU, the National Park Service has the discretion to deliver water in excess of the Ranch's basic water right of 486,000,000 gallons per year. Park staff has exercised this discretionary option in the past, and between 1990 and 1994, administrative records suggest an average of

143 million gallons of water per year were delivered to the Ranch above their legal entitlement. Most of this water was used to irrigate a golf course and provide water to two flow-through swimming pools during the summer months. During the warmer months following May of each year, the total monthly water consumption by the Ranch can increase by 7,380,000 gallons as compared to the months of December and January.

At the present time, the Ranch has questioned the validity of historical records that have been used to document the amount of water that was delivered to their property; it remains clear, however, that water deliveries to the Ranch have tended to increase dramatically during the summer months as compared to other months of the year when air temperatures are cooler. Staff at Death Valley National Park have been installing new, more sensitive flow meters at several locations in the Furnace Creek Ranch area in an effort to better quantify the amount of water that is being delivered to the Ranch.

Approximately 83 million gallons of water per year are collected from the Nevares Spring water gallery in the Cow Creek area. This water is delivered to a National Park Service employee housing and office area.

The majority of the water collection systems that have been installed in the Travertine Springs and Nevares Spring areas consist of perforated pipe galleries that were installed after the original spring sources were excavated. Data that document the extent of streams in the Complex prior to the development of the water collection systems were not collected. During the summer of 1999, water was diverted from the Travertine Springs water collection system to the surface environment because harmful bacteria were present in the potable water supply. The need to temporarily turn on and off various portions of the Travertine Springs water collection system allowed spring water to be released to the surface environment; this created an unprecedented opportunity to assess the effects of water diversion activities. A Global Positioning System (GPS) was used to map the extent of surface water with and without water being diverted to the Furnace Creek domestic water supply. The results of the GPS mapping suggest that water diversion activities in the Furnace Creek area are collectively responsible for the loss of 36,500 feet of stream habitat when the system is fully operational (Threlhoff and Koenig 1999). The work with the GPS also demonstrated that operation of the Travertine Springs water collection facilities are collectively responsible for eliminating 80-85% of the aquatic habitat that could potentially occur in that area. Approximately 80% of the streams in the Travertine Springs area that persist when the water collection system is operational have attributes (i.e., current or abandoned water diversion structures or evidence of ground disturbance) that suggest that they have been or are adversely affected by historical or ongoing water diversion activities.

The original spring outflow and biological community for Texas Spring was completely eliminated when the current water collection system was developed and the entire spring discharge was diverted into the Furnace Creek potable water collection system (Shepard 1993). This action eliminated a stream habitat that probably was at least 24,000 feet in length prior to its diversion. A small stream habitat 100 feet west of the historical Texas Spring orifice was partially restored in the mid-1990s when Park maintenance staff diverted a portion of the spring discharge to the local surface environment.

An in-depth study of the effects of water diversion activities on the Travertine-Nevares Springs Complex invertebrate community has recently been completed (Sada and Herbst 2000). The study found that the presence and abundance of different aquatic invertebrate species in the Complex were affected by factors such as water velocity and depth, amount of plant cover, and the size and presence of different substrates. Each of these factors is in turn influenced by the intensity of water diversion activities. As water is diverted from a stream, water velocity and depth and wetted perimeter width is reduced, which in turn affects adjacent plant communities and the preponderance of silts and gravels along the stream bottom. The study also found trends that suggest that decreased water flow in a stream channel causes changes in the:

1. Presence or absence of endemic species, including the Nevares Spring naucorid bug.
2. Total number of aquatic invertebrate species that are present at a given location.
3. Relative abundance of aquatic species in the invertebrate community, and
4. Abundance of individual endemic and non-endemic aquatic invertebrate species, including the Nevares Spring naucorid bug.

The cumulative effect of removing 40-52 million gallons of water each month from the Travertine Springs area has created effects that suggest the remaining populations of *Ambrysus funebris* are relatively small, isolated, and vulnerable to extirpation. The effects of these water diversion activities are most pronounced during the summer months when more water is diverted to flow-through swimming pools and a golf course; these water diversions coincide with a period of high evapo-transpiration which causes the aquatic habitats that are occupied by the species to be most restricted and vulnerable to perturbation.

In October 2005, the National Park Service released an environmental impact statement that evaluates three new scenarios for collecting water in the Furnace Creek area. The preferred alternative includes a strategy for restoring some aquatic habitat in the Furnace Creek area, but also includes a proposal to install ground water pumping wells up-gradient from the Travertine Spring Complex where the Nevares Spring naucorid bug occurs (National Park Service 2005). The National Park Service estimates that the proposed pumping activity associated with the preferred alternative could result in a 24% reduction in spring flows in Travertine and Texas Springs area.

- B. Overutilization for commercial, recreational, scientific, or educational purposes: This factor is not known to currently affect the Nevares Spring naucorid bug.
- C. Disease or predation: Naucorids are predatory animals; they consume a number of prey species that include small aquatic insects and crustaceans. Nevares Spring naucorid bugs that occur in Furnace Creek Wash along the southern boundary of the Travertine Springs area co-occur with non-native mosquitofish (*Gambusia affinis*). The presence of mosquitofish in Furnace Creek Wash is likely to adversely affect *Ambrysus funebris* by a) direct predation of young and adult naucorids, and b) competition for food resources. The mosquitofish is a generalist predator (Bence 1988, Linden and Ceck 1990, Rupp 1996). Field experiments that evaluated survival rates of low density mosquito larvae populations

when mosquitofish were present suggest that none of the mosquito larvae persisted after a five-hour trial period (Goodsell and Kats 1999). Other studies have demonstrated that mosquitofish eliminate *Daphnia* and other invertebrate populations (Hurlbert et al. 1972). Additional field experiments have revealed that mosquitofish significantly reduce the abundance of predatory aquatic insect species that include notonectids, belostmatids, and odonates (Lawyer et al. 1999). These animals are typically as large as or larger than individuals of *Ambrysus funebris*. It is therefore likely that if mosquitofish are able to prey on a large variety of aquatic invertebrates, including larger predatory insects, they are likely to eat smaller prey items such as Nevares Spring naucorid bugs. An overlap in the diet of mosquitofish and Nevares Spring naucorid bugs is also likely to exist because both species prey on aquatic invertebrate species and the number of local prey species is relatively limited in diversity and number. Collectively, these studies suggest that Nevares Spring naucorid bugs are likely to experience direct predation by mosquitofish, and compete with these fish for limited food resources.

An introduced crayfish (*Procambarus* sp.) is known to be present in aquatic habitats on the Ranch; these habitats are within two miles of streams that are occupied by the Nevares Spring naucorid bug. Recent studies have indicated that introduced crayfish alter vegetation communities in aquatic environments (Lodge and Lorman 1987, Chambers et al. 1990, Creed 1994, Lodge et al. 1994) and they adversely affect aquatic invertebrate species through direct predation (Chambers et al. 1990, Hanson et al. 1990, Fernandez and Rosen 1996). Because flash flood events infrequently occur in the Travertine Springs area, there is a potential that temporary aquatic corridors could develop between the Furnace Creek Ranch area and the Travertine Springs area, and thereby create a dispersal corridor that would allow crayfish to colonize stream habitats where Nevares Spring naucorid bugs are present. At least one published account indicates that crayfish have the potential to quickly and effectively disperse into previously unoccupied habitats (Momot 1966). In the event that crayfish dispersed from the Ranch to the Travertine Springs area, it is likely that crayfish would dramatically reduce the limited number of *Ambrysus funebris* that inhabit the spring complex.

- D. The inadequacy of existing regulatory mechanisms: The Nevares Spring naucorid bug does not benefit from existing regulatory mechanisms that could be provided by the state of California or the Federal government.

The species is not currently classified as a threatened, endangered, rare, or species of special concern by the state of California. The state of California is unlikely to list an invertebrate as threatened or endangered; this statement is based on the fact that only three invertebrate species have been classified as threatened or endangered by the state, while 77 vertebrate taxa have been listed. The state has no regulations that specifically protect invertebrates from habitat loss. If the state of California did classify the Nevares Spring naucorid bug as a listed species, it is unlikely that the National Park Service would recognize state jurisdiction over the species because the federal government claims jurisdiction over the federal reserves it manages.

Ambrysus funebris was classified as a candidate Category 2 species in the November 1994

Animal Candidate Notice of Review. The status of the species at that time was considered to be declining. The candidate Category 2 status was discontinued in February 28, 1996 (61 FR 7596), and only Category 1 species became recognized as candidates for listing purposes. Plants and animals that were classified previously as candidate Category 2 species were considered to be those that might require special management consideration to prevent future listing as threatened or endangered. The species does not currently appear on any advisory watch list that is maintained by the state or federal government. There are also no management plans or similar documents at the present time that specifically mention the need to protect the Nevares Spring naucorid bug or its habitat.

The Nevares Spring naucorid bug does not have a geographic distribution that overlaps the range of another taxon that is listed as threatened or endangered. There are, therefore, no regulatory requirements to prevent adverse effects to the species' aquatic habitat because it does not co-occur with a listed species.

- E. Other natural or manmade factors affecting its continued existence: Non-native date palms (*Phoenix dactylifera*) and fan palms (*Washingtonia filifera*) are present in the spring habitats that are occupied by the Nevares Spring naucorid bug. The effects of these plants on aquatic communities have not been documented, but anecdotal observations suggest these plant species transpire water that would otherwise be available to maintain water flow within a stream channel. These plants also reduce the primary productivity within an aquatic environment by shading stream channels; this effect in turn is likely to reduce the number of prey items available to the naucorid because overgrown stream habitats are likely to have fewer invertebrates. The presence of palm trees also tends to reduce the overall number of aquatic invertebrates in a stream channel because palm roots and fallen fronds reduce water velocities that maintain riffle habitats that are required by naucorids. Park staff have been injecting palm trees with herbicide in an effort to slow the colonization of local stream channels by palm trees, but palms continue to be present in several of the stream channels in the Travertine - Nevares Springs Complex.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED: A conservation agreement that would improve the status of the Nevares Spring naucorid bug has not been initiated, and Death Valley National Park staff have not committed funds or provided documentation that would initiate the development of a conservation agreement.

SUMMARY OF THREATS (including reasons for addition or removal from candidacy, if appropriate): The various spring habitats that are occupied by the Nevares Spring naucorid bug have experienced a variety of adverse effects that have collectively reduced the geographic range of the species and degraded the suitability of the limited number of aquatic habitats where the species continues to persist. The activities that have adversely affected the status of the Nevares Spring naucorid bug include past and ongoing water diversion activities, past and ongoing predation/competition from nonnative fish species, potential future predation by nonnative crayfish, a current lack of regulatory mechanisms that could be afforded by the state of California, and the alteration and degradation of naucorid habitat that has resulted from the ongoing presence of nonnative plant species. The distribution of the naucorid is limited to 12 small streams, and the density of naucorids in the streams where it does occur is low. The

species has specific habitat affinities that make it susceptible to water diversion activities, and the flightless nature of the species suggests it is unable to disperse to, or colonize, new aquatic habitats. And finally, the National Park Service is proposing pumping activities that have the potential to affect the quality of the aquatic habitat where the naucorid occurs. The endemism of the Nevares Spring naucorid bug, the low number of habitats that it occupies, and the diversity of factors that adversely affect the species demonstrate the magnitude of the threats facing the species is high. The immediacy of the threats facing the naucorid are not likely to result in the extinction of the species within the next several months, and we therefore believe the threats are non-imminent. Because the Nevares Spring naucorid bug is a taxonomically recognized species, we assign a listing priority number of 5 for the taxa.

For species that are being removed from candidate status:

___ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5*
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: The magnitude of threats pertaining to the Nevares Spring naucorid bug should be considered to be high, given that multiple activities or threats have the potential to further reduce the number of naucorids or degrade the habitat quality in many or most of the remnant wetlands where the species persists. For example, if crayfish were to invade the aquatic habitats where the Nevares Spring naucorid bug occurred, it is likely that the abundance of the candidate species would be seriously reduced beyond the already low levels. Furthermore, because National Park Service staff do not routinely conducted surveys for crayfish, the invasion of crayfish into

naucorid-occupied habitat would not be detected until well after the aquatic invertebrate community had been drastically affected.

Imminence: Threats affecting the Nevares Spring naucorid bug should be considered to be non-imminent at the present time but perturbations, especially anthropogenic activities, that could adversely affect the species or its habitat, have the ability to quickly materialize and threats that could affect the species could become imminent.

Rationale for Change in Listing Priority Number (insert if appropriate)

____ Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed? Yes.

Is Emergency Listing Warranted?: Emergency listing is not warranted at this time because an activity that is likely to extirpate all of the Nevares Spring naucorid bugs in the Travertine-Nevares Spring Complex in the next 12 months has not been identified.

DESCRIPTION OF MONITORING: Current monitoring of the population levels of, or habitat conditions associated with, the Nevares Spring naucorid bug is not occurring at the present time. The Service and park staffs are not aware of other entities (universities, the U.S. Geological Survey, etc.) that are proposing to conduct future field work involving the insect or its habitat. Staff from the Ventura Fish and Wildlife Office periodically attempt to determine if any new literature has been published for the species, and they will occasionally call Park staff to determine if there are any proposed projects that may affect the status of the species.

COORDINATION WITH STATES:

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: No state within the range of the species provided information or comments on the species or latest species assessment.

Indicate which State(s) did not provide any information or comments: the State of California did not provide any information or comments on the species or latest species assessment.

LITERATURE CITED

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Paul Henson April 26, 2006
Acting CNO Manager, Fish and Wildlife Service Date

Concur: _____ Date _____
Director, Fish and Wildlife Service

Do not concur: _____ Date _____
Director, Fish and Wildlife Service

Director's Remarks:

Date of annual review:
Conducted by: